



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁴ : B65D 63/08, F16B 2/08</p>	<p>A1</p>	<p>(11) International Publication Number: WO 86/ 07333</p> <p>(43) International Publication Date: 18 December 1986 (18.12.86)</p>
<p>(21) International Application Number: PCT/GB86/00311</p> <p>(22) International Filing Date: 3 June 1986 (03.06.86)</p> <p>(31) Priority Application Number: 8514508</p> <p>(32) Priority Date: 7 June 1985 (07.06.85)</p> <p>(33) Priority Country: GB</p> <p>(71) Applicant (for all designated States except US): BOW-THORPE-HELLERMANN LIMITED [GB/GB]; Crawley, West Sussex RH10 2RZ (GB).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only) : McCORMICK, Matthew [GB/GB]; 87 Morningside Drive, East Didsbury, Manchester 20 (GB).</p> <p>(74) Agent: GIBSON, Stewart, Harry; Urquhart-Dykes & Lord, Midsummer House, 419B Midsummer Boulevard, Central Milton Keynes MK9 3BN (GB).</p>		<p>(81) Designated States: AT (European patent), BE (European patent), BR, CH (European patent), DE (European patent), DK, FR (European patent), GB, GB (European patent), IT (European patent), LU (European patent), NL (European patent), NO, SE (European patent), US.</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: METAL TIE</p> <div style="text-align: center;"> </div>		
<p>(57) Abstract</p> <p>A metal tie comprises a strip (10) of metal which is formed with apertures (12) at intervals along its entire length, and a metal head-member (14) attached to one end of the strip. The head member defines an aperture (16) for the free end (15) of the strip to be passed through, and has a tang (18) which will locate into the apertures (16) of the strip and prevent its retraction once tied. The apertured strip (10) may be cut to length from a reel or other supply of the strip in indefinite length, then be attached to the head-member e.g. by welding or by having its end inserted through the head and simply bent back on itself.</p>		

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METAL TIE

The invention relates to a tie formed of metal and useful, for example, for tying together a bundle of cables or other elements.

5 Cable ties formed of plastics material are known, such a tie comprising a strap portion provided on one side with a series of transverse ratchet serrations, and an apertured head at one end of the strap: the strap is passed around the bundle of cables to be tied and the free end of the strap is passed through the head for a pivoted
10 pawl within the head-aperture to interlock with the ratchet serrations on the strap. Although these plastics ties have been satisfactory for their purposes, there are situations where metal ties are needed.

15 In accordance with this invention, there is provided a metal tie, comprising an elongate strip of metal which is formed with apertures at intervals along its entire length, and a metal head member attached to one end of said strip, the head defining an aperture for the free end of the strip to be passed through and having a tang
20 which projects at an angle across the head-aperture and in the direction of insertion of the free end of the strip, such that the tang will locate into the apertures of the strip and prevent retraction of the strip from the head.

25 In a preferred embodiment of this metal tie, the head-aperture extends in the lengthwise direction of the strip

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so that the free end of the strip is inserted through the head-aperture flat against the portion of strip which is adjacent the head.

5 The metal tie of this invention has the particular advantage that its apertured-strip may be cut to required length (either in the factory or by the user) from a reel or other supply of the apertured strip material of indefinite length, then have the head member attached to one of its ends. This attachment may be effected by welding,
10 or simply by inserting one end of the strip through the head and bending it back on itself to lock to the head.

Embodiments of this invention will now be described by way of examples only and with reference to the accompanying drawings, in which:

15 FIGURE 1 is a plan view of one embodiment of metal tie, on an enlarged scale;

FIGURE 2 is a longitudinal section through the tie on the line II-II of Figure 1;

20 FIGURE 3 is a cross-section of the tie on the line III-III of Figure 1;

FIGURE 4 is a longitudinal section through the head member of the tie, showing attachment to the apertured strip by passing the latter through the head and simply bending it back on itself;

25 FIGURE 5 is a cross-section similar to that of Figure 3, but showing the head member attached to the apertured strip the other way up;

FIGURE 6 is a plan view of a portion of apertured strip with modified shape to its apertures; and

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FIGURE 7 is a plan view of a modified head member having strengthening ribs and two locking tangs.

- Referring to the drawings, there is shown a tie formed of steel and comprising an elongate, flexible strip 10 of 0.01 inch (0.25mm) thickness and 7mm width and formed with identical transverse, rectangular apertures 12 at regular intervals along its entire length, the tie further comprising a head 14 attached to one end of the strip 10. The head 14 defines an aperture 16 for the free end 15 of the strip to be passed through it in the direction indicated by the arrow: in the example shown this direction is parallel to the length of the strip and such that the inserted, free end of the strip will lie flat against the head-end portion of strip.
- The head is formed from strip or sheet steel bent to define the aperture. From one wall of the head, a tang 18 is pressed out to lie at an angle, inclined across the aperture and extending generally in the strip-insertion direction. In the example shown, the tang is pressed out from a wall of the head which lies parallel to and is spaced from the head-end portion of the strip, i.e. a wall of the head which is on the opposite side of the aperture 16 from the strip. Also in the example shown, the head is formed from a separate strip of steel which has been bent into generally rectangular shape (Figure 3) and had its end portions welded to the main strip 10 on its underside.
- In use of the metal tie shown in Figures 1 to 3, the strip 10 is passed around the bundle of cables (or other element or elements) to be tied and its free end 15 is passed through the head aperture 16 in the direction of the arrow in Figures 1 and 2. Initially the extreme end of the strip 10 strikes the tang 18, applying pressure to the tang to

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deflect it sufficiently to allow the strip 10 to be advanced. The extreme end of the tang then presses against and slides over the surface of strip 10, until the first aperture 12 of strip 10 reaches the tang. Under the influence of its own slight springiness, the tang locates into this aperture 12, but is then deflected away again when the trailing edge of that aperture strikes the tang. This sequence repeats for the successive apertures 12 until the tie has been tightened as required. Then, if any force is applied to withdraw the strip 10 from the head in the opposite direction, tang 18 will locate in an aperture (if it is not already so-located) and the trailing edge of that aperture will strike the tang and ride up the rear surface 18a of the tang: the tang will now effectively lock the strip 10 against withdrawal.

The metal tie is designed and intended so that the strip 10 may be cut to length from a reel or like supply of apertured strip material of indefinite length, then have the separate head member attached to it. The attachment may be effected by welding as mentioned above and may be carried out either in the factory, or in the field by the user. Alternatively, and as shown in Figure 4, the attachment may be effected by inserting the one end of the strip (duly cut to required length) through the head and simply bending it back on itself to lock to the head. This form of attachment may again be carried out either in the factory by the manufacturer, or in the field by the user.

Figure 5 shows an alternative mode of attaching the head member to the strip, wherein the head is turned the other way up and its main wall (from which the tang 18 projects) is welded to the upper side of the strip.

The tie is not limited to the dimensions mentioned above

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for the examples shown in Figures 1 to 5. For example, the apertures 12 may be closer together to provide finer adjustment of the tie when tied. The aperture 12 may be rounded at their opposite ends 12a as shown in Figure 6:
5 this is found to improve the tensile strength of the strip relative to a strip having apertures with sharp corners. For some applications, a wider strip may be required: in this case, the head may be strengthened by the provision of longitudinal ribs 20 as shown in Figure 7 and two
10 tangs 18 may be provided one after the other.

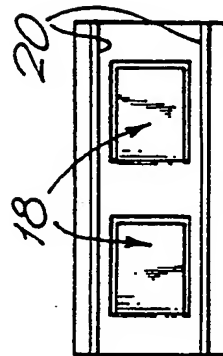
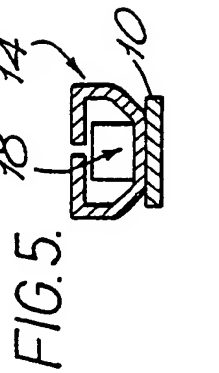
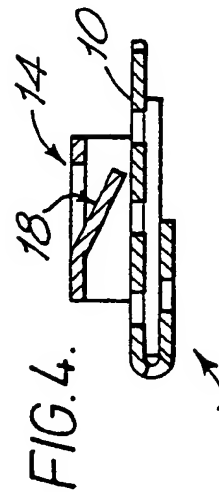
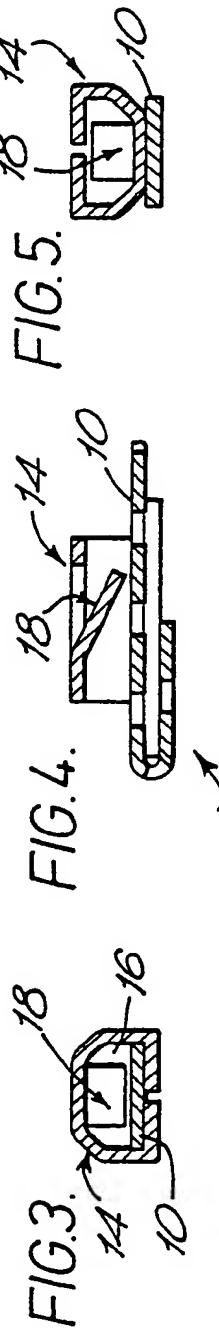
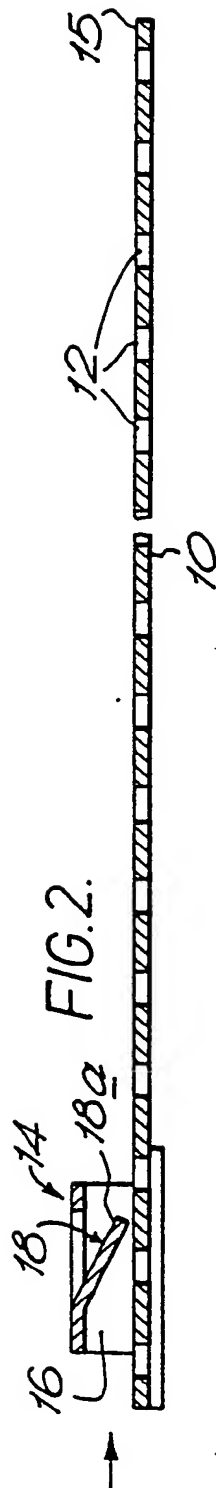
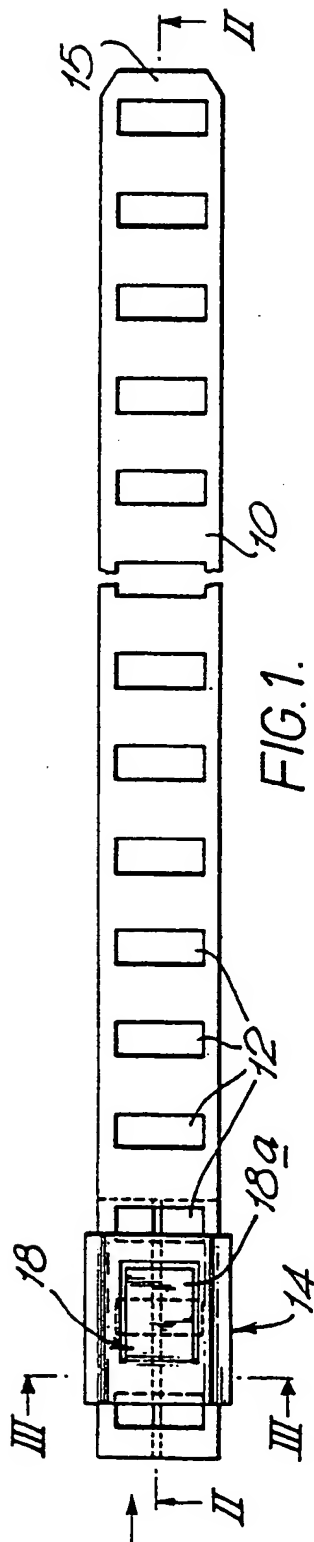
In all examples, the strip 10 and the head member may be coated with a polymeric material to protect the user's hands, and the tied cables, from any sharp edges of the metal elements, and also as protection against corrosion.

CLAIMS

1. A metal tie, comprising an elongate strip of metal (10) which is formed with apertures (12) at intervals along its entire length, and a metal head member (14) attached to one end of said strip, the head defining an aperture (16) for the free end of the strip to be passed through and having a tang (18) which projects at an angle across the head-aperture and in the direction of insertion of the free end (15) of the strip, such that the tang will locate into the apertures of the strip and prevent retraction of the strip from the head.
2. A metal tie as claimed in Claim 1, in which the head member (14) is formed from sheet metal bent to define said aperture and having said tang pressed out of one of its walls.
3. A metal tie as claimed in Claim 2, in which the head member (14) is formed from a strip of metal bent into generally rectangular shape.
4. A metal tie as claimed in Claim 3, in which the apertured strip (10) has its said one end passed through the head-aperture and said strip from which said head is formed has its opposite end portions welded to the underside of said apertured strip (10).
5. A metal tie as claimed in Claim 2 or 3, in which said one wall of said head member is welded to a side of said apertured strip (Figure 5).
6. A metal tie as claimed in any one of Claims 1 to 3, in which said apertured strip (10) has its one end passed through the head-aperture (16) and bent back on itself to lock to the head (Figure 4).

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7. A metal tie as claimed in any preceding claim, in which the apertures (12) in said strip (10) are in the shape of rectangles extending transversely of the strip, but with their ends (12a) rounded.
- 5 8. A metal tie as claimed in any preceding claim, in which the head-member is formed with two said tangs (18) one behind the other.
9. A metal tie as claimed in any preceding claim, in which the head-member is formed with longitudinal ribs
10 (20).
10. A metal tie as claimed in any preceding claim, in which the apertured-strip (10) is cut to length from a supply of apertured strip material of indefinite length, then attached at one of its ends to said head member.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 86/00311

I. CLASSIFICATION F SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC ⁴ : B 65 D 63/08; F 16 B 2/08																	
II. FIELDS SEARCHED <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none; padding: 5px;">IPC⁴</td> <td style="border: none; padding: 5px;">B 65 D; F 16 L</td> </tr> </table> <div style="text-align: center; margin-top: 10px; font-size: small;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div>			Classification System	Classification Symbols	IPC ⁴	B 65 D; F 16 L											
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IPC ⁴	B 65 D; F 16 L																
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; text-align: left; padding: 5px;">Category ⁹</th> <th style="width: 60%; text-align: left; padding: 5px;">Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 30%; text-align: left; padding: 5px;">Relevant to Claim No. ¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">DE, A, 2817413 (SIEMENS) 31 October 1979, see page 6, lines 21-36, pages 7,8; figures</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-3,6,8,10</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="text-align: center; vertical-align: top; padding: 5px;">--</td> <td style="text-align: center; vertical-align: top; padding: 5px;">4</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">EP, A, 0001974 (PANDUIT CORP.) 30 May 1979, see page 6, lines 2-4; figures</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,7</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="text-align: center; vertical-align: top; padding: 5px;">-----</td> <td style="text-align: center; vertical-align: top; padding: 5px;">4</td> </tr> </tbody> </table>			Category ⁹	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	DE, A, 2817413 (SIEMENS) 31 October 1979, see page 6, lines 21-36, pages 7,8; figures	1-3,6,8,10	Y	--	4	X	EP, A, 0001974 (PANDUIT CORP.) 30 May 1979, see page 6, lines 2-4; figures	1,7	Y	-----	4
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<div style="display: flex; justify-content: space-between; font-size: x-small;"> <div style="width: 45%;"> <p>[*] Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																	
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; padding: 5px;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border: none; padding: 5px;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="border: none; padding: 5px;">4th September 1986</td> <td style="border: none; padding: 5px;">08 OCT 1986</td> </tr> <tr> <td style="border: none; padding: 5px;">International Searching Authority</td> <td style="border: none; padding: 5px;">Signature of Authorized Officer</td> </tr> <tr> <td style="border: none; padding: 5px;">EUROPEAN PATENT OFFICE</td> <td style="border: none; padding: 5px;">M. VAN MOL </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	4th September 1986	08 OCT 1986	International Searching Authority	Signature of Authorized Officer	EUROPEAN PATENT OFFICE	M. VAN MOL							
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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 86/00311 (SA 13453)

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 2817413	31/10/79	None	
EP-A- 0001974	30/05/79	US-A- 4128919	12/12/78

For more details about this annex :
see Official Journal of the European Patent Office, No. 12/82